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**DRAFT**

Development of Biocriteria for Wetlands in Montana

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*Abstract:* A goal of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Attainment of this goal includes development and implementation of wetland water quality standards. In an effort to create wetland-specific water quality standards, the Montana Department of Environmental Quality is attempting to develop biocriteria that are sensitive and responsive to changes in wetland water quality. We sampled diatom and macroinvertebrate communities and associated environmental variables from 80 Montana wetlands. We designed the study to sample approximately 75% reference sites and 25% impaired sites having known anthropogenic impacts. Diatoms were collected as a composite grab sample, identified to the lowest taxonomic level feasible and analyzed using multivariate procedures. Macroinvertebrates were collected using a 1 *mm* mesh D-net, identified to a standardized taxonomic level and assessed using multimetric techniques. We initially classified the wetlands using ecoregions and hydrogeomorphology and later delineated several of the wetland classes using water-column chemistry variables. Diatoms and macroinvertebrates were useful for evaluating the biological integrity of perennial wetlands with stable surface water habitats that were not excessively alkaline or saline. We concluded that multivariate analysis was a useful tool for developing a wetland classification system and that hydrogeomorphology and ecoregions were practical approaches to classifying wetlands for the development of biocriteria. Both the multimetric and multivariate techniques were valuable for developing wetland biocriteria. In most cases, the multimetric and multivariate approaches that we used to assess the macroinvertebrate and diatom communities both identified the same wetlands as being impaired.

*Key Words*: wetlands, biocriteria, reference condition, diatoms, macroinvertebrates, multivariate analysis, multimetrics, classification, hydrogeomorphology, ecoregion, Montana.